



Carolina Power & Light Company

35 MAY 14 P 2:05 P.O. Box 101, New Hill, N.C. 27562
May 10, 1985

Dr. J. Nelson Grace
United States Nuclear Regulatory Commission
Region II
101 Marietta Street, Northwest (Suite 2900)
Atlanta, Georgia 30323

NRC-362

**CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT
1986 - 900,000 KW - UNIT 1
BOLTED STRUCTURAL CONNECTIONS WITH EXCESSIVE GAPS AND
ASTM A325 NUTS ON ASTM A490 BOLTS, ITEM 92**

Dear Dr. Grace:

Attached is our final report on the subject item which was deemed reportable per the provisions of 10CFR50.55(e), on April 26, 1983. With this report, Carolina Power and Light Company considers this matter closed.

If you have any questions regarding this matter, please don't hesitate to contact me.

Yours very truly,

R. M. Parsons
Project General Manager
Completion Assurance
Shearon Harris Nuclear Power Plant

RMP/aj

Attachment

cc: Messrs. G. Maxwell/R. Prevatte (NRC-SHNPP)
Mr. R. C. DeYoung (NRC)

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CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

UNIT NO. 1

FINAL REPORT

BOLTED STRUCTURAL CONNECTIONS WITH EXCESSIVE GAPS
AND ASTM A325 NUTS ON ASTM A490 BOLTS
ITEM 92

May 10, 1985

REPORTABLE UNDER 10CFR50.55(e)

SUBJECT: Shearon Harris Nuclear Power Plant/Unit No. 1, 10CFR50.55(e), reportable deficiency, Bolted Connections with Excessive Gaps and ASTM A325 Nuts on ASTM A490 Bolts.

ITEM: Bolted structural steel connections in the Unit No. 1 Turbine and Containment Buildings have gaps, or areas with 0% contact between mating surfaces in friction connections. The part of this problem concerning the use of A325 nuts on A490 bolts was previously found to be non-reportable and so reported on November 30, 1982 (CP&L letter NRC-26).

SUPPLIED BY: Not a supplier-related deficiency. Structural connections concerned were field assembled.

NATURE OF DEFICIENCY: The Turbine Building is seismically designed per Regulatory Guide 1.29, and the Containment Building is a Seismic Class I structure. These structural connections were designed as friction type connections requiring solid seating of the mating surfaces. These connections were previously inspected and accepted.

DATE PROBLEM OCCURRED: June 22, 1982

DATE PROBLEM REPORTED: On July 2, 1982, CP&L (L. E. Jones) notified the NRC (Mr. A. Hardin) that the item was potentially reportable. On April 26, 1983, CP&L (N. J. Chiangi) notified the NRC (Mr. A. Hardin) that this item was reportable per the provisions of 10CFR50.55(e).

SCOPE OF PROBLEM: A reinspection of the Turbine and Containment Buildings, including structural connections where there was a potential for these gaps occurring, has been completed. An engineering evaluation had determined that the gaps would not occur in connections with beam end clips or plates less than 5/8" thick. In standard design, these clips deflect slightly under bolt tension to make contact with the adjacent mating surface. Main support girder end clips were generally fabricated from 1" thick angle, and end plate thicknesses in some members exceeded 2".

A total of approximately 878 connections were reinspected in the Turbine Building and approximately 500 in the Containment, with gaps being found in approximately 154 and approximately 36, respectively. Additional connections in the Turbine Building with gaps have been identified in inspections since the reinspection addressed by this reportable item was completed. These connections were found to lack documentation, indicating they had not been inspected previously.

SAFETY IMPLICATION:

The inability of the end clips and end plates to deflect under bolt tension, to close the mating surface gaps resulting from fabrication tolerances (allowing the girders to be fabricated slightly short for erection purposes) has two implications. The lack of contact area may affect the slip resistance in the friction connection. But more importantly, where the surfaces are not in contact, the bolt tension load is transferred to the weld attaching the clip or plate to the girder, potentially overstressing the weld.

**REASON DEFICIENCY
IS REPORTABLE:**

Reportable due to the magnitude of the problem plus the extensive evaluation and/or rework required.

CORRECTIVE ACTION:

Appropriate site technical procedures have been revised to specifically require inspection for mating surface gaps during erection. Inspection and craft personnel have received additional training in inspection and erection of structural steel through formal classes and on-the-job training.

Permanent Waivers (PW's) were written, requiring engineering evaluation, for each identified deficient connection. Each connection not accepted "as-is", as not being significantly deficient, has been repaired to make it acceptable, based on this engineering evaluation. In addition to the deficiency documented in this report, structural connections in the Turbine and Containment Buildings also exhibited evidence of grease between mating surfaces and, in the Turbine Building, torch cut bolt holes. These conditions were reported as NRC Reportable Items 102 and 112, respectively. Connections in the Containment Building have been accepted or repaired based on engineering evaluations. In the course of the reinspections, the welded parts of the connections were inspected as well, and any identified deficiencies were documented.

Ebasco Services has completed a reanalysis of the Turbine Building structure taking into consideration the identified defects in combination. Actions required to close this item have now been completed.